

## REMARKS

Reconsideration of the present application, in view of the arguments presented herein, is respectfully requested.

### I. STATUS OF THE CLAIMS

Claims 1, 3-5, 10-16, 21-33 and 35-37 are pending in the present application.

### II. Rejections Under 35 U.S.C. § 103(a):

(i) Claims 1, 3-5, 11-16, 22-33, 35 and 36 have been rejected as being unpatentable over U.S. Patent No. 6,054,248 to Foster et al. ("the Foster patent") in view of U.S. Patent No. 4,276,136 to Gruber et al. ("the Gruber patent"), U.S. Patent No. 6,261,687 to Ryang et al. ("the Ryang patent") or U.S. Patent Application Publication No. 2004/0009428 to Tamura et al. ("the Tamura patent").

(ii) Claims 1, 3, 5, 11, 12, 24-28, 35 and 37 have been rejected as being unpatentable over Foster in view of Ryang, Gruber, Tamura or Foster in view of U.S. Patent No. 6,146,793 to Schaedeli et al. ("the Schaedeli patent").

(ii) Claims 10 and 21 have been rejected as being unpatentable over Foster in view of Ryang, Gruber or Tamura or Foster in view of Ryang, Gruber, Tamura in view of Schaedeli in view of U.S. Patent No. 6,319,655 to Wong et al. ("the Wong patent").

In response, it is submitted the above rejections have been traversed for the reasons set forth below.

### CLAIMS 1, 24 AND 35

The combination of Foster, with Gruber, Ryang, or Tamura or the combination of Foster with Schaedeli each fail to teach or suggest all of the features recited in claims 1, 24, or 35.

In particular, the combination of Foster, with Gruber, Ryang, or Tamura or the combination of Foster with Schaedeli each at the very least fail to teach or suggest a method of forming an underlayer of a bi-layer resist film (claims 1 and 24) or a method of forming a semiconductor device using a bilayer resist film (claim 35) which includes forming a blended material by blending a polymer having an aromatic group and a methacrylate polymer and wherein the polymer having the aromatic group is a novolac polymer or a naphthalene polymer, as essentially recited in claims 1, 24 and 35.

The Examiner has erroneously stated that Foster teaches forming the same blended material as recited in claims 1, 24 and 35. Rather, as described below, the Examiner appears to have failed to understand the difference between a blended material (as recited in claims 1, 24 and 35) and a copolymer or terpolymer as described in Foster.

Foster is completely silent with regard to blending a novolac polymer or naphthalene polymer with a methacrylate polymer to form the specific blended material as required by claims 1, 24 and 35. The instant Office Action states that Foster describes copolymers or terpolymers which may include methacrylate monomers units and aromatic monomer units(e.g. styrene). (See **page 3 of the instant Office Action**). However, these co-polymers and ter-polymers are not a blended material formed by blending a polymer having an aromatic group and a methacrylate polymer, as required by claims 1, 24 and 35. Rather, the above-described polymers in Foster appear simply to be copolymers and terpolymers which may possibly include aromatic monomer units and methacrylate monomer units.

Copolymers and terpolymers which may possibly include aromatic monomer units and methacrylate units such as those described in Foster are not the same as a blended material formed by blending a novolac or naphthalene polymer and a methacrylate polymer, as required by claims 1, 24 and 35 for at least the reasons set forth below. For example, the blended material recited in claims 1, 24 and 35 is formed by mixing two polymers (a novolac polymer or naphthalene polymer with an methacrylate polymer) together. In contrast, the formation of copolymers or terpolymers such as those described in Foster does not involve any mixing or blending of polymers. Rather, these copolymers or terpolymers are formed by covalently

bonding aromatic monomers (e.g. styrene monomer) to a methacrylate monomers via a polymerization process to form a copolymer or terpolymers having these aromatic monomer units and methacrylate monomer units.

Accordingly, it is clear that the copolymers or terpolymers described in Foster, including those copolymers or terpolymers which may possibly include aromatic monomer units and methacrylate monomer units are not the same as the blended materials recited in claims 1, 24 and 35. Thus, Foster at the very least fails to teach or suggest teach or suggest a method of forming an underlayer of a bi-layer resist film (claims 1 and 24) or a method of forming a semiconductor device using a bilayer resist film (claim 35) which includes forming a blended material by blending a polymer having an aromatic group and a methacrylate polymer and wherein the polymer having the aromatic group is a novolac polymer or a naphthalene polymer, as essentially recited in claims 1, 24 and 35.

Moreover, the combination of Foster, with Gruber, Ryang, or Tamura or the combination of Foster with Schaedeli fails to cure the above-mentioned deficiencies of the Foster reference because as with Foster, Gruber, Ryang, Tamura and Schaedeli each also at the very least fail to teach or suggest a method of forming an underlayer of a bi-layer resist film (claims 1 and 24) or a method of forming a semiconductor device using a bilayer resist film (claim 35) which includes forming a blended material by blending a polymer having an aromatic group and a methacrylate polymer and wherein the polymer having the aromatic group is a novolac polymer or a naphthalene polymer, as essentially recited in claims 1, 24 and 35. In other words, as with Foster, none of the above cited references teach or suggests forming the specific blended material in the manner recited in claims 1, 24 and 35. It is also noted that although Schaedeli, mentions novolac resins, it fails to teach or suggest blending a novolac polymer and a methacrylate polymer to form a blended material in the manner recited in claims 1, 24 and 35.

Therefore, for at least the reasons set forth above, withdrawal of the above rejections to claims 1, 24 and 35 is requested. As claims 3-5, 11-12 and 36-37 depend from claim 1 and claims 25-28 depend from claim 24, withdrawal of the rejection to these dependent claims is likewise requested.

Next, with regard to rejection claim 10, it is noted that this claim depends from and incorporates all of the limitations of claim 1 and thus this claim is patentable over the Foster, Gruber, Ryang, Tamura and Schaedeli for at least the reasons set forth above with regard to claim 1. Moreover, Wong fails to cure the above noted deficiencies of the Foster, Gruber, Ryang, Tamura and Schaedeli references because Wong also at the very least fails to teach or suggest a method of forming an underlayer of a bi-layer resist film (claims 1 and 24) or a method of forming a semiconductor device using a bilayer resist film (claim 35) which includes forming a blended material by blending a polymer having an aromatic group and a methacrylate polymer and wherein the polymer having the aromatic group is a novolac polymer or a naphthalene polymer, as essentially recited in claims 1, 24 and 35. Therefore, for at least the reasons set forth above, withdrawal of the rejection to claim 10 is requested.

### CLAIMS 13 AND 29

In response, it is respectfully submitted that the cited references fail to render claims 13 and 29 obvious.

Claims 13 and 29 each essentially recite a method which includes using an e-beam to form an underlayer of a bilayer resist. As conceded by the Examiner in the instant Office Action, Foster fails to teach or suggest using an e-beam to form an underlayer of a bilayer resist.

In addition, the Examiner has failed to provide sufficient motivation for modifying the process of Foster to e-beam cure the polymers of Foster using the e-beaming processes described in Gruber, Ryang, Tamura and/or Schaedeli as proposed in the instant Office Action. As is well known under the U.S. Patent Laws, the Examiner bears the initial burden of establishing a prima facie conclusion of obviousness. (See MPEP 2142).

In particular, the Examiner has failed to meet the above burden because the motivation asserted by Examiner in the instant Office Action that it would have been obvious to employ an e-beam to cure the thermally curable underlayer of Foster because Gruber, Ryang, Tamura each teach it is conventionally known to do so is clearly erroneous. The above statement is erroneous, because although these references discuss photosensitive compositions, none of the

compositions or methods described in Gruber, Ryang, Tamura even relate to e-beaming a coating to form an underlayer of a bilayer resist. In other words, the e-beams described Gruber, Ryang, Tamura are not used to form an underlayer of a bilayer resist. Furthermore, it also appears that none of Gruber, Ryang, Tamura, or Schaedeli describe e-beam curing polymers which are the same or similar to the polymers described in Foster.

Moreover, in an attempt to support the proposed motivation to combine, the Examiner simply states that the above references teach e-beam curing similar polymers as described in Foster, but yet the Examiner fails to provide even one example from any of the Gruber, Ryang, Tamura, or Schaedeli. references which shows a similarity between any of the polymers described in these references and the Foster reference. The Office Action is completely silent regarding the specifics of any alleged similarity between the polymers of Foster and those polymers described other cited references which would support a motivation to combine.

Thus, the motivation provided by the Examiner in the instant Office Action is nothing more than conclusory and is therefore insufficient for establishing the requisite motivation for making the combination proposed set forth in the instant Office Action. Accordingly, for at least the reasons discussed above, the Examiner's rejections of claims 13 and 29 and the claims dependent thereon (claims 14-16, 22, 23, and 30-33) should likewise be withdrawn.

### **III. Conclusion:**

For the foregoing reasons, the present application is believed to be in condition for

allowance. The Examiner's early and favorable action is respectfully requested. The Examiner is invited to contact the undersigned if he has any questions or comments in this matter.

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